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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/787,317

02/27/2004

Yasuhisa Fujii

67161-144

4327

7590

04/05/2005

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EXAMINER

SOWARD, IDA M

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SA

<b>Office Action Summary</b>	<b>Application No.</b> 10/787,317	<b>Applicant(s)</b> FUJII ET AL.	
	<b>Examiner</b> Ida M. Soward	<b>Art Unit</b> 2822	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2-27-04</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

This Office Action is in response to the application filed February 27, 2004.

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Besser (US 6,368,967 B1).

**In regard to claim 1**, Besser teaches a semiconductor device (Figure 17), comprising:

a first copper layer 1125 (column 9, lines 60-63);

an insulating layer 1120 (column 10, line 20) formed on the first copper layer 1125 and having a via 1220 (Figure 15, column 10, lines 66-67) reaching the first copper layer 1125;

a second copper layer 1740 electrically connected to the first copper layer 1125

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through the via 1220; and

a barrier layer 1525A (column 11, lines 36-47) located between the second copper layer 1740 and the insulating layer 1120, and between the first copper layer 1125 and the second copper layer 1740, the barrier layer 1525A having a structure with a tantalum nitride layer sandwiched by layers having a better adhesive property to copper than the tantalum nitride layer (Figure 17, column 11, lines 36-47).

**In regard to claim 2**, Besser teaches the barrier layer 1525A having a multi-layer structure with the tantalum nitride layer sandwiched by tantalum layers (Figure 17, column 11, lines 38-41).

**In regard to claim 3**, Besser teaches a semiconductor device, comprising:

a first copper layer 1125;

an insulating layer 1120 formed on said first copper layer 1125 and having a via 1220 reaching the first copper layer 1125; and

a second copper layer 1740 electrically connected to the first copper layer 1125 through the via 1220, at least either one of the first and second copper layers 1125 & 1740 containing an inert element (Figure 17, column 14, lines 4-19).

**In regard to claim 4**, Besser teaches the inert element being argon (Figure 17, column 14, lines 4-19).

**In regard to claim 5**, Besser teaches a semiconductor device, comprising:

a first copper layer 1125;

an insulating layer 1120 formed on said first copper layer 1125 and having a via 1220 reaching the first copper layer 1125; and

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a second copper layer 1740 electrically connected to the first copper layer 1125 through the via 1220, at least either one of the first and second copper layers 1125 & 1740 containing an element in group 8 of a periodic table (Figure 17, column 14, lines 4-19).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to the claimed semiconductor device:

Gupta et al. (US 6,740,580 B1)

Levine et al. (GB 2365215 A)

Ngo et al. (US 6,723,634 B1)

Saito et al. (US 2001/0045651 A1)

Tsai et al. (US 6,638,830 B1)

Uzoh (5,930,669)

Watanabe et al. (US 6,407,453 B1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M. Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday 6:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS

April 1, 2005

*John M. Sawant*  
*A.U. 2822*